Fatally Injured Pedestrians and Bicyclists in the United States with High Blood Alcohol Concentrations

February 2017

Angela H. Eichelberger
Insurance Institute for Highway Safety

Anne T. McCartt
Insurance Institute for Highway Safety

Jessica B. Cicchino
Insurance Institute for Highway Safety

1005 N. Glebe Road, Suite 800
Arlington, VA 22201
+1 703 247 1500

iihs.org

ABSTRACT

Objective: Little research has focused on the problem of alcohol impairment among pedestrians and bicyclists in the United States. The aim of the current study was to investigate the prevalence, trends, and characteristics of alcohol-impaired fatally injured pedestrians and bicyclists.

Methods: Data from the Fatality Analysis Reporting System (FARS) were analyzed for fatally injured passenger vehicle drivers, pedestrians, and bicyclists 16 and older during 1982-2014. Personal, roadway, and crash characteristics were examined for pedestrians and bicyclists killed in crashes during 1982-86 and 2010-14, and logistic regression models examined which characteristics were associated with high blood alcohol concentrations (BACs) among these road users.

Results: The percentage of fatally injured pedestrians with high BACs (≥0.08 g/dL) declined from 45 percent in 1982 to 35 percent in 2014. The percentage of fatally injured bicyclists with high BACs declined from 28 percent in 1982 to 21 percent in 2014. By comparison, the percentage of fatally injured passenger vehicle drivers with high BACs declined from 51 percent in 1982 to 32 percent in 2014. During the study periods, the largest reductions in alcohol impairment among fatally injured pedestrians and bicyclists were found among ages 16-20. During the most recent study period (2010-14), fatally injured pedestrians and bicyclists ages 40-49 had the highest odds of having a high BAC, compared with other age groups.

Discussion: A substantial proportion of fatally injured pedestrians and bicyclists have high BACs, and this proportion has declined less dramatically than for fatally injured passenger vehicle drivers during the past three decades. Most countermeasures used to address alcohol-impaired driving may have only limited effectiveness in reducing fatalities among alcohol-impaired pedestrians and bicyclists. Efforts should increase public awareness of the risk of walking or bicycling when impaired, and further research should evaluate the effectiveness of potential countermeasures directed at alcohol-impaired pedestrians and bicyclists.

Keywords: pedestrians; bicyclists; fatalities; alcohol; motor vehicle crashes

Research topics: Alcohol and drugs: Crashes and injuries; Bicyclists; Pedestrians: Injuries and fatalities

INTRODUCTION

In 2014, 4,600 pedestrians and 650 bicyclists ages 16 and older in the United States were fatally injured in motor vehicle crashes (Insurance Institute for Highway Safety, 2016). These deaths accounted for 17 percent of all traffic fatalities among people these ages. Alcohol is an important factor in pedestrian and bicyclist deaths, but research has focused less on alcohol impairment and more on other factors such as roadway design.

Alcohol impairment among pedestrians and bicyclists increases their risk of being seriously injured or killed in a crash. In a matched case-control study in Maryland, the odds of being killed or seriously injured in a crash during the daytime were 20 times greater for bicyclists 15 and older with blood alcohol concentrations (BACs) of 0.08 g/dL and higher relative to bicyclists with BACs of less than 0.02 g/dL (Li et al., 2001). A recent case-crossover study examined bicyclists treated for nonfatal injuries in three Canadian emergency departments and found that alcohol use was associated with 4 times the odds of injury (Asbridge et al., 2014). Alcohol use prior to the injury, defined as self-reported use during the six hours prior to the crash or a positive BAC in a blood test, was compared with self-reported use during the six hours preceding the last time a bicyclist rode on the same day of the week as their injury.

A U.S. study found that pedestrians also are more likely to be killed or injured in a crash when they have BACs of 0.10 g/dL and higher than when they have zero BACs (Blomberg et al., 1979). Among pedestrians and bicyclists involved in crashes or treated for injuries in emergency departments, the risk of death or serious injury is higher for those who are alcohol impaired compared with those who are not (Kaplan et al., 2014; Kim et al., 2007; Lee and Abdel-Aty, 2005; Miles-Doan, 1996; Sethi et al., 2016; Spaite et al., 1995; Zajac and Ivan, 2003).

There are several mechanisms by which drinking can increase the risk of injury or fatality among pedestrians or bicyclists. Riding a bicycle requires a high level of psychomotor skill, and psychomotor skills in general degrade with increasing BAC. Crash-involved bicyclists who have been drinking are less likely to wear helmets than bicyclists who have not been drinking, and thus are more likely to sustain head injuries (Crocker et al., 2010). Alcohol impairment also contributes to decreased cognitive functioning and poor decision making. In a simulated road-crossing study, adults with BACs of 0.07-0.10 g/dL had difficulty integrating speed and distance information when selecting gaps in traffic compared with controls who did not ingest alcohol (Oxley et al., 2006). Dultz and colleagues (2011) found that among crash-involved pedestrians treated at a trauma center, those who had been drinking were more likely at the time of the crash to have crossed the road at a dangerous location, such as at

an intersection against the traffic signal or midblock without a traffic signal, than pedestrians who had not been drinking.

A few U.S. studies have examined the characteristics of fatally injured pedestrians and bicyclists who were alcohol impaired. Li and Baker (1994) examined bicyclists killed in crashes during 1987-91 and found that those most likely to have BACs of 0.10 g/dL and higher were male, ages 25-34, or killed in nighttime versus daytime crashes. In 1992, the per capita death rate for pedestrians with BACs of 0.10 g/dL and higher was greatest for those ages 25-34, and the proportion of fatally injured pedestrians with BACs of 0.10 g/dL and higher was larger among males versus females and among those killed in rural versus urban crashes (Heermann et al., 1994). Shankar (2003) reported that pedestrians ages 30-39 who were killed in single-vehicle crashes in 2001 had the highest proportions of BACs of 0.08 g/dL and higher, with ages 20-29 and 40-49 closely following. High proportions of crashes at night or involving male pedestrians also had elevated proportions of high BACs.

Because these studies are more than 10-20 years old, the goal of the current study is to provide an up-to-date description of the prevalence, trends, and characteristics of fatally injured pedestrians and bicyclists with high BACs in the United States.

METHODS

The study analyzed 1982-2014 data from the Fatality Analysis Reporting System (FARS), a census of motor vehicle crashes that occur on U.S. public roadways and result in at least one death of a vehicle occupant or nonoccupant within 30 days of the crash. Analyses focused on fatally injured pedestrians, bicyclists, and passenger vehicle drivers who were 16 and older. All results are reported at the person level. The FARS dataset includes BACs from alcohol tests, as well as imputed BACs when the actual BAC was not reported. Subramanian (2002) describes the methods used for imputing missing values. All reported findings are based on actual and imputed BACs.

Trends during 1982-2014 were examined for the percentage of fatally injured passenger vehicle drivers, pedestrians, and bicyclists with high BACs, defined as 0.08 g/dL and higher. Using the oldest and most recent five years of available data (1982-1986 and 2010-14), personal characteristics (age, sex), roadway and crash characteristics (rural vs. urban, roadway type, intersection, number of vehicles), and time of day and day of week of the crash were examined among fatally injured pedestrians and bicyclists by BAC group (0.00, 0.01-0.079, and ≥0.08 g/dL). In addition, driver characteristics (age, sex, BAC, driving error) were examined for fatally injured pedestrians and bicyclists in single-vehicle crashes by pedestrian or bicyclist BAC group. Driver error was based on

driver-related contributing factors coded in FARS and was defined as physical movements of the vehicle indicative of driver mistakes (e.g., speeding, improper lane change, passing on the wrong side). Speeding included cases in which the driver was cited for speeding or in which the driver-related factors included traveling above the posted speed limit or too fast for conditions, or racing. Physical or mental conditions such as inattention or drowsiness and alcohol impairment were excluded from the definition of driver error.

Logistic regression models of pedestrians and bicyclists killed in crashes during 1982-86 and during 2010-14 examined whether personal, roadway, and crash characteristics were associated with the presence of high BACs among fatally injured pedestrians and bicyclists 16 and older. These factors were examined in separate regression analyses for pedestrians and bicyclists. Location of crash (intersection vs. not at intersection) was dropped from the regression analyses because it was confounded with urban versus rural and roadway type. Cases with missing data were excluded from the regression models. Results were considered statistically significant at the 0.05 level.

RESULTS

Between 1982 and 2014, the number of deaths of passenger vehicle drivers 16 and older decreased 21 percent, with the lowest number in 2014 (15,436 deaths). During the same time period, the number of deaths of pedestrians 16 and older declined 23 percent, with the lowest number in 2009 (3,811 deaths). In contrast, the number of deaths among bicyclists 16 and older increased 46 percent, with the highest number in 2013 (681 deaths).

Trends in the percentage of fatally injured people 16 and older with high BACs

During the study period 1982-2014, the percentage of fatally injured people 16 and older with high BACs (≥0.08 g/dL) declined most dramatically among passenger vehicle drivers. As shown in Figure 1, the percentage of fatally injured passenger vehicle drivers with high BACs declined steadily from 51 percent in 1982 to 33 percent in 1997. This proportion has remained at about one-third since 1997 and was 32 percent in 2014. Similarly, among fatally injured pedestrians 16 and older, the percentage with high BACs declined gradually from 45 percent in 1982 to 35 percent in 1997. This proportion then changed little and was 35 percent in 2014. Among fatally injured bicyclists 16 and older, there was no clear trend in the proportion with high BACs between 1982 and 2000, but the proportion generally declined during 2000-14; the percentage with high BACs was 28 percent in 1982, 31 percent in 2000, and 21 percent in 2014.

Declines in the percentage of fatally injured people with high BACs between the study periods 1982-86 and 2010-14 were greatest among drivers, pedestrians, and bicyclists ages 16-20, compared with other age groups (see Table 1). The percentage of fatally injured people ages 16-20 with high BACs (≥0.08 g/dL) decreased from 41 to 25 percent for pedestrians, from 18 to 9 percent for bicyclists, and from 46 to 26 percent for passenger vehicle drivers. The percentage of fatally injured pedestrians and passenger vehicle drivers with high BACs (≥0.08 g/dL) declined for all age groups between the study periods. The percentage of fatally injured bicyclists with high BACs also decreased for those 29 and younger but changed little for the older age groups.

The percentages of fatally injured pedestrians, bicyclists, and passenger vehicle drivers with high BACs (≥0.08 g/dL) were much greater among males than among females for both study periods (Table 1). The prevalence of high BAC among fatally injured pedestrians and passenger vehicle drivers was similar for males and females during 1982-86 and declined by 2010-14, especially for male passenger vehicle drivers. The relative prevalence of high BACs among male and female fatally injured bicyclists varied little between the two study periods.

Characteristics of fatally injured pedestrians and bicyclists 16 and older and their crashes

Table 2 displays the characteristics of fatally injured pedestrians and bicyclists 16 and older and the characteristics of their crashes by BAC group for the 1982-86 and 2010-14 study periods. There were greater percentages of males among fatally injured pedestrians and bicyclists with high BACs (≥0.08 g/dL) than among those who were sober (0.00 g/dL) during both study periods, and the proportions changed little between the study periods. Among all BAC groups, there were greater percentages of fatally injured pedestrians and bicyclists who were younger than 30 during 1982-86 than during 2010-14. The majority of pedestrian and bicyclist deaths, across all BAC groups and during both study periods, occurred in urban locations; the proportions of these deaths were greater during 2010-14, with the largest increases among those with high BACs. The minority of pedestrian and bicyclist deaths across all BAC groups and during both study periods occurred at intersections; the proportions of these deaths were greater during 2010-14, with the largest increases among bicyclists with BACs of 0.01-0.079 or 0.08 g/dL and higher. Peak crash times for fatally injured pedestrians and bicyclists with BACs of 0.01-0.079 or 0.08 g/dL and higher during the two study periods tended to occur later in the evening, compared with crash times for those with zero BAC. Pedestrians and bicyclists with BACs of 0.01-0.079 or 0.08 g/dL and higher more often were killed on weekends during the two study periods, compared with those with zero BAC.

Driver characteristics in single-vehicle crashes involving fatally injured pedestrians and bicyclists 16 and older

The vast majority of pedestrians and bicyclists 16 and older were killed in single-vehicle crashes (92 percent of pedestrians and 97 percent of bicyclists during 1982-86, and 90 percent of pedestrians and 96 percent of bicyclists during 2010-14). Table 3 displays the percentages of pedestrian and bicyclist deaths in single-vehicle crashes with various driver characteristics by pedestrian and bicyclist BAC group. During both study periods, the majority of pedestrian and bicyclist deaths in single-vehicle crashes involved male drivers and drivers ages 21-29; the distributions of driver sex and age varied little across the pedestrian and bicyclist BAC groups. The proportion of pedestrians and bicyclists killed in single-vehicle crashes by drivers with high BACs (≥0.08 g/dL) and drivers with driver errors declined between the two study periods, with the largest declines among pedestrians and bicyclists with positive or high BACs. Nearly one-third of fatalities among pedestrians and bicyclists with high BACs during 1982-86 involved a driver with a high BAC, compared with 16 percent during 2010-14. The proportion of alcohol-impaired pedestrians and bicyclists killed in single-vehicle crashes with driver errors decreased by about one-half between the two study periods.

Factors associated with high BACs among fatally injured pedestrians and bicyclists 16 and older

Multivariable logistic regression models were conducted to examine the variables associated with high BACs among fatally injured pedestrians and bicyclists during 1982-86 and 2010-14 (Table 4). Variables that were significantly associated with alcohol impairment (BAC ≥0.08 g/dL) in both the pedestrian and bicyclist models included the age and sex of the pedestrian or bicyclist and the time of day and day of week of the crash. During both study periods, age and time of day were significant predictors of alcohol impairment among fatally injured pedestrians and bicyclists. Among fatally injured pedestrians, ages 40-49 had the highest odds of alcohol impairment during both study periods. Among fatally injured bicyclists, ages 30-39 had the highest odds of alcohol impairment during 1982-86, and ages 40-49 had the highest odds of alcohol impairment during 2010-14. During both study periods, pedestrians and bicyclists killed in nighttime crashes had higher odds of alcohol impairment compared with those killed in daytime crashes.

Fatally injured pedestrians in urban locations had significantly lower odds of alcohol impairment relative to those in rural locations during 1982-86, but urban location was not a significant predictor of alcohol impairment among fatally injured pedestrians during 2010-14. Among fatally injured bicyclists, those in urban locations had

significantly higher odds of alcohol impairment relative to those in rural locations during 2010-14, but urban location was not a significant predictor during 1982-86.

DISCUSSION

During the past three decades in the United States, a substantial proportion of fatally injured pedestrians and bicyclists 16 and older were alcohol impaired (i.e., BAC ≥0.08 g/dL). It is clear that strong laws aimed at reducing alcohol-impaired driving (e.g., *per se* BAC limits, administrative driver's license revocation) have contributed to the decline in high BACs among passenger vehicle drivers from the early 1980s to mid-1990s (Dang, 2008; Voas and Tippetts, 1999; Zador et al., 1989). During this time period, enforcement efforts aimed at increasing the public's perception that alcohol-impaired drivers will be arrested and penalized (e.g., sobriety checkpoints) also have been shown to be effective (e.g., Lacey et al., 1990; Wells et al., 1992). Considerably less research and far fewer laws and programs have addressed alcohol-impaired pedestrians and bicyclists.

As of 2015, four U.S. states had laws specifically prohibiting bicycling under the influence, and in an additional 21 states and the District of Columbia, impaired bicyclists can be charged with driving under the influence under the general impaired driving statute (McLeod, 2015). However, it is unknown how often these laws are applied, and their effectiveness in deterring impairment among bicyclists has not been evaluated. With regard to walking while impaired, some states and local communities have public intoxication laws that prohibit individuals from appearing drunk or under the influence of drugs in public.

Some laws and programs associated with declines in drunk driving could have an impact on alcohol impairment among pedestrians and bicyclists. The largest reductions in alcohol impairment among fatally injured pedestrians and bicyclists in the current study were found among those younger than 21. During the first study period (1982-86), many U.S. states had a minimum legal drinking age (MLDA) younger than 21. Since 1988, all states and the District of Columbia have had MLDA-21 laws, which prohibit drinking among people younger than 21. Previous research has found that higher MLDAs were associated with decreases in alcohol consumption (O'Malley and Wagenaar, 1991) as well as reductions in drinking and driving among young people (McCartt et al., 2010). Thus, it is likely that MLDA-21 laws contributed to the reductions in alcohol impairment among young fatally injured pedestrians and bicyclists observed in this study.

The current study also found reductions in alcohol impairment for some age groups 21 and older. For all age groups of fatally injured pedestrians 21 and older, reductions in alcohol impairment between the two study

periods were similar to those found among fatally injured passenger vehicle drivers of the same age groups. Among fatally injured bicyclists, reductions in alcohol impairment were found for ages 21-29, but there was little difference in this proportion among those 30 and older. As mentioned above, tougher drinking and driving laws help explain reductions in alcohol impairment among passenger vehicle drivers. General declines in alcohol consumption among the U.S. population during the study periods could contribute to reductions in alcohol impairment among drivers, pedestrians, and bicyclists. Per capita alcohol consumption in the United States declined from the early 1980s to the late 1990s and then gradually increased during the subsequent decade (Haughwout et al., 2016).

It is not clear why all age groups in the current study showed declines in alcohol impairment with the exception of middle-age and older bicyclists. Research has shown that cycling is increasing among middle-age adults (Pucher et al., 2011), and a recent study of bicyclists treated in emergency departments during 1998-2013 found that injuries decreased among bicyclists younger than 45 but increased for those 45 and older (Sanford et al., 2015). Given these trends, it may be particularly important to examine to alcohol impairment among middle-age bicyclists.

The rate of alcohol impairment is high among drivers as well as pedestrians and bicyclists involved in late-night fatal crashes, and impaired drivers appear to have contributed to some of the deaths of impaired pedestrians and bicyclists. During 2010-14, 16 percent of fatally injured pedestrians and bicyclists 16 and older with high BACs in single-vehicle crashes involved passenger vehicle drivers with high BACs. Other driver-related factors also contribute to deaths among alcohol-impaired pedestrians and bicyclists. Among alcohol-impaired pedestrians and bicyclists 16 and older killed in single-vehicle crashes during 2010-14, at least one driver error other than alcohol impairment was present in 10 percent of pedestrian deaths and 16 percent of bicyclist deaths.

There are several countermeasures that potentially can address the problem of alcohol impairment among pedestrians and bicyclists. An educational program in Baltimore, Maryland, employed numerous methods of reaching pedestrians and drivers, including television and radio public service announcements, a law enforcement training video on appropriate responses to the impaired pedestrian problem, distribution of educational materials within the community, and roadway signs informing drivers to watch for pedestrians in areas with large numbers of alcohol-impaired pedestrian crashes. The program was associated with a reduction in pedestrian fatalities among males ages 30-59 (Blomberg and Cleven, 2000). However, the program was not implemented in other cities and was discontinued in Baltimore. Given the general lack of educational campaigns alerting the public to the risk of alcohol

impairment when walking or bicycling, it is likely that the public is largely unaware of the problem. The focus on alcohol-impaired driving may unintentionally lead people to believe that walking or bicycling after drinking is safer.

Responsible beverage service — alcohol sales policies intended to prevent restaurant and bar patrons from being served when they are impaired or underage — have the potential to reduce pedestrian and bicyclist crashes. However, studies suggest these policies are not well enforced. In a study of 231 bars and restaurants, patrons 21 and older were likely to be served alcohol even when they were obviously impaired (Lenk et al., 2006), and a national survey found that a majority of state and local law enforcement agencies reported that sales to impaired patrons were common in their jurisdictions (Lenk et al., 2014). Twenty percent of local agencies and 60 percent of state agencies said they conducted enforcement efforts to reduce sales to impaired patrons, but most of these agencies reported that enforcement activities were conducted infrequently (yearly or a few times a year).

Ride-service programs that transport drinkers home also could be marketed to pedestrians and bicyclists, but the programs typically are limited to certain time periods, such as around holidays. Similarly, the recent proliferation of ridesharing companies could make it easier for drinkers to get home without driving, biking, or walking, particularly in areas that are not well served by taxis.

Engineering countermeasures designed to prevent pedestrian and bicycle crashes and injuries generally separate pedestrians and bicyclists from vehicles, making pedestrians and bicyclists more visible to drivers. Lowering vehicle speeds also could reduce fatalities involving pedestrians and bicyclists with high BACs. Many alcohol-impaired fatalities occur at night, so improved roadway and vehicle lighting would allow drivers to spot and react to these nonmotorists more quickly.

In summary, although alcohol impairment among fatally injured pedestrians and bicyclists has declined during the past three decades, it remains a substantial problem in the United States. Despite potentially effective countermeasures, little has been done to address the problem. Further research should evaluate the effectiveness of potential countermeasures for alcohol-impaired pedestrians and bicyclists.

ACKNOWLEDGEMENTS

This work was supported by the Insurance Institute for Highway Safety.

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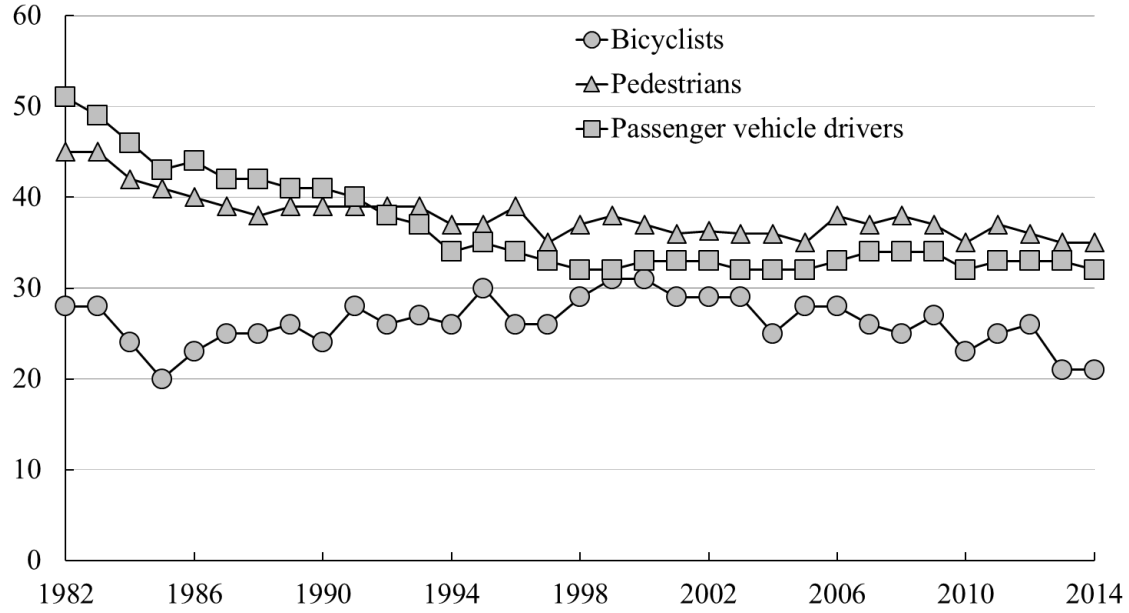

Figure 1. Percentage of fatally injured people 16 and older with BACs ≥0.08 g/dL by type, 1982-2014

Table 1. Percent of fatally injured people 16 and older with BACs ≥0.08 g/dL, 1982-86 and 2010-14

	Pedestrians				Bicyclists				Passenger vehicle drivers			
	1982-86		2010-14		1982-86		2010-14		1982-86		2010-14	
Characteristic	Total deaths	Percent with BAC ≥0.08 g/dL	Total deaths	Percent with BAC ≥0.08 g/dL	Total deaths	Percent with BAC ≥0.08 g/dL	Total deaths	Percent with BAC ≥0.08 g/dL	Total deaths	Percent with BAC ≥0.08 g/dL	Total deaths	Percent with BAC ≥0.08 g/dL
Age (years)												
16-20	2,900	41	1,332	25	610	18	261	9	17,086	46	7,830	26
21-29	5,886	59	3,285	47	569	31	395	19	29,318	61	16,961	48
30-39	4,485	58	2,997	46	326	33	354	32	18,629	56	12,008	45
40-49	3,158	56	3,586	49	162	30	589	33	10,209	48	10,836	40
50-59	3,157	49	4,400	43	186	29	844	29	8,535	36	10,971	30
60 and older	8,830	17	6,143	14	320	10	713	11	16,503	16	19,763	11
Gender												
Male	20,274	49	15,170	41	1,865	27	2,762	25	74,969	53	55,002	37
Female	8,138	27	6,566	24	307	12	392	12	25,309	29	23,364	21
Total	28,416	43	21,743	36	2,173	25	3,156	23	100,280	47	78,369	32

Table 2. Percent of fatally injured pedestrians and bicyclists 16 and older in crashes with various personal, roadway, and crash characteristics by BAC group, 1982-86 and 2010-14

	BACs (g/dL) of fatally injured pedestrians						BACs (g/dL) of fatally injured bicyclists					
	1982-86			2010-14			1982-86			2010-14		
Characteristic	0.00 (N=14,776)	0.01-0.079 (N=1,541)	≥0.08 (N=12,099)	0.00 (N=12,974)	0.01-0.079 (N=1,002)	≥0.08 (N=7,767)	0.00 (N=1,516)	0.01-0.079 (N=125)	≥0.08 (N=533)	0.00 (N=2,286)	0.01-0.079 (N=140)	≥0.08 (N=730)
Gender												
Male	62	76	82	64	69	80	83	88	93	86	82	94
Female	38	24	18	36	31	20	17	12	7	14	18	6
Unknown	<1	0	<1	<1	0	<1	<1	0	0	<1	0	<1
Age (years)												
16-20	10	16	10	7	6	4	31	29	20	10	8	3
21-29	14	25	29	12	17	20	23	32	34	13	16	10
30-39	11	15	22	11	15	18	13	22	20	10	9	15
40-49	8	10	14	13	16	23	7	5	9	16	25	26
50-59	10	9	13	18	23	24	8	6	10	25	25	34
60 and older	47	24	13	39	23	11	18	6	6	27	17	10
Rural vs. urban												
Rural	28	35	39	24	24	27	37	33	37	32	28	24
Urban	72	65	60	75	76	72	63	67	62	67	71	76
Unknown	<1	<1	<1	1	1	1	<1	1	<1	1	1	1
Roadway type												
Interstates	16	17	17	15	16	16	7	7	7	4	6	4
Other major roads	32	34	34	32	35	38	30	37	31	31	36	39
Minor roads	52	49	49	52	47	45	63	57	62	64	57	56
Unknown	0	0	0	1	1	1	0	0	0	2	1	1
Location of crash												
Intersection	28	18	16	30	25	21	32	23	25	38	35	35
Not at intersection	72	82	84	70	75	78	68	77	74	61	65	65
Unknown	<1	<1	<1	<1	<1	<1	<1	0	<1	<1	0	<1
Number of vehicles												
Single vehicle	92	91	93	89	89	91	97	96	95	97	96	95
Two vehicles	6	7	6	8	8	7	2	4	4	3	3	3
More than two vehicles	2	1	1	2	3	2	1	1	<1	1	2	2
Time of crash												
6-8:59 a.m.	10	4	2	14	5	2	11	4	2	15	7	3
9-11:59 a.m.	11	2	1	8	3	1	11	5	2	14	8	3
12-2:59 p.m.	11	4	1	8	2	1	15	6	4	14	9	4
3-5:59 p.m.	15	8	5	12	7	5	19	12	10	16	11	12
6-8:59 p.m.	24	25	22	24	28	25	20	24	24	18	26	29
9-11:59 p.m.	16	26	30	17	26	32	15	24	32	13	28	29
12-2:59 a.m.	8	23	27	7	18	21	7	20	21	4	6	13
3-5:59 a.m.	5	8	11	9	11	13	2	4	4	5	5	6
Unknown	<1	1	1	<1	1	1	<1	1	1	<1	0	<1
Day of week												
Sunday	11	16	19	11	16	19	12	14	17	11	19	18
Monday	14	11	9	14	13	11	16	11	12	14	11	11
Tuesday	14	11	9	15	11	10	15	9	11	14	14	12

Wednesday	14	9	9	15	12	10	13	8	11	15	14	12
Thursday	15	11	11	15	13	11	13	15	9	15	13	12
Friday	18	18	17	16	17	16	16	20	18	16	17	15
Saturday	15	24	26	14	17	23	13	22	22	14	11	19

Note: Percentages do not always sum to 100 percent due to rounding.

Table 3. Percent of fatally injured pedestrians and bicyclists 16 and older in single-vehicle crashes with various driver characteristics by pedestrian or bicyclist's BAC group, 1982-86 and 2010-14

	BACs (g/dL) of fatally injured pedestrians						BACs (g/dL) of fatally injured bicyclists					
	1982-86			2010-14			1982-86			2010-14		
Characteristic	0.00 (N=13,628)	0.01-0.079 (N=1,408)	≥0.08 (N=11,239)	0.00 (N=11,581)	0.01-0.079 (N=891)	≥0.08 (N=7,034)	0.00 (N=1,473)	0.01-0.079 (N=120)	≥0.08 (N=508)	0.00 (N=2,210)	0.01-0.079 (N=134)	≥0.08 (N=692)
Gender of driver												
Male	71	69	68	65	63	62	73	78	71	66	63	66
Female	20	16	16	26	25	25	19	12	17	27	26	27
Unknown	9	14	15	9	12	14	8	10	12	7	11	7
Age of driver (years)												
<16	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	0	<1
16-20	13	15	13	8	8	7	13	17	18	9	10	7
21-29	29	30	30	19	19	21	29	33	29	21	18	24
30-39	19	19	19	16	15	17	20	17	19	16	14	16
40-49	11	10	10	16	17	15	11	9	8	16	17	18
50-59	8	6	7	15	14	14	9	5	8	14	20	13
60 and older	10	5	5	17	13	12	9	5	6	17	11	13
Unknown	10	16	16	9	13	14	9	11	13	7	11	8
Driver's BAC												
Zero	76	63	63	84	77	79	74	60	60	86	81	81
0.01-0.079	4	6	6	3	5	4	4	8	7	3	4	3
0.08-0.149	8	14	13	5	8	7	8	13	14	5	8	7
0.15 and above	11	17	16	6	9	9	13	19	18	6	8	9
Unknown	1	1	1	1	<1	<1	0	0	0	<1	0	0
Driver error*												
Yes	31	29	19	23	17	10	35	38	30	30	21	16
Failure to yield/obey traffic control or improper turn	11	7	4	12	6	3	9	4	6	12	7	4
Speeding	10	12	8	8	7	5	12	19	11	9	8	6
Reckless driving	8	9	6	3	2	2	10	13	10	3	2	2
Lane departure	7	7	3	3	3	1	7	6	4	5	3	2
Other driver errors	2	2	1	3	2	1	3	6	3	4	3	2
No or unknown	69	71	81	77	83	90	65	62	70	70	79	84

Note: Percentages do not always sum to 100 percent due to rounding.
* Multiple errors are possible.

Table 4. Logistic regression models of alcohol impairment (BAC ≥0.08 g/dL) among fatally injured pedestrians and bicyclists age 16 and older, 1982-86 and 2010-14

	Pedestrians				Bicyclists			
	1982-86 (N=28,162)		2010-14 (N=21,394)		1982-86 (N=2,154)		2010-14 (N=3,104)	
Predictor variable	Odds ratio	*p* value	Odds ratio	*p* value	Odds ratio	*p* value	Odds ratio	*p* value
Male pedestrian or bicyclist	2.01	<0.01	2.09	<0.01	2.43	<0.01	2.36	<0.01
Age of pedestrian or bicyclist (years)								
16-20	1.68	<0.01	1.38	<0.01	1.10	0.72	0.71	0.22
21-29	3.71	<0.01	3.69	<0.01	2.50	<0.01	1.53	0.03
30-39	4.18	<0.01	3.82	<0.01	3.14	<0.01	3.03	<0.01
40-49	4.20	<0.01	4.83	<0.01	2.90	<0.01	3.57	<0.01
50-59	3.59	<0.01	3.91	<0.01	2.94	<0.01	3.40	<0.01
60 and older (reference)	1.00	—	1.00	—	1.00	—	1.00	—
Nighttime (9:00 p.m.-5:59 a.m.)	3.43	<0.01	2.69	<0.01	3.47	<0.01	2.89	<0.01
Weekend (Saturday or Sunday)	1.54	<0.01	1.65	<0.01	1.40	0.02	1.60	<0.01
Urban	0.81	<0.01	0.97	0.49	0.92	0.56	1.34	0.02
Road type								
Interstate	0.78	<0.01	0.75	<0.01	0.94	0.83	0.92	0.76
Other major road	1.08	0.02	1.21	<0.01	0.91	0.56	1.20	0.07
Minor road (reference)	1.00	—	1.00	—	1.00	—	1.00	—